

corded. During the 12th the Washington river also rose, owing to a heavy snow and rain storm in the mountains. By this time the flood had spread over a great portion of Yolo Co., and the water on the 11th was within three miles of Woodland, forming a vast lake to the north and south. On the 13th it extended eighteen miles below Sacramento. On the 14th the water fell somewhat, but rose again on the 15th, reaching 24 ft. 1 inch, at noon of the 15th, 16th and 17th. On the 17th very heavy rains fell in the Upper Sacramento valley and heavy snows on the mountains, and during the afternoon the river rose at the rate of one foot per hour at Red Bluff; at 9 p. m., 24 feet above low-water mark was recorded and still rising at midnight; numerous breaks occurred in the levees on the Yolo side of the river, and 100 feet of the Sacramento Valley railroad track was washed away at Lexington Crossing. On the 18th the water again rose at Sacramento city, and the upward tendency continued until 7:40 p. m. of the 20th, when 25 feet 11½ inches was recorded, the water reaching Front-street railroad track, and being the highest ever known. By 2:45 p. m. it had fallen to 24 ft. 8 in., and the decline continued to end of month. At noon of the 20th the levee below Washington gave way, and on the 21st the town was almost totally inundated, houses were swept away, and the crevasses in Yolo county exceeded six miles in extent. Extensive overflows also occurred in Colusa county, and in Sutter county a track of country, 15 to 20 miles long and 8 miles wide, was covered to an average depth of 4 to 6 feet. On the 21st the levees protecting the islands in the delta of the Sacramento gave way, and Andros, Brannan and Grand islands were almost entirely submerged, with immense loss of property. At the close of the month reports from Sacramento say the whole of Sacramento valley, on both sides of the river, for a distance of 150 miles, is under water, excepting a few well-guarded cities and towns. In Washington the streets were still several feet under water, and houses were being undermined and careening over. A report from Camanche, Calaveras Co., Cal., says that on the 17th, 4:30 p. m., during a heavy rain-storm, a cloud burst in the hills south of here; four funnel-shaped clouds were observed passing in a northeasterly direction, apparently accompanied by heavy precipitation. Soon the slopes of the hills were covered with torrents of water. In a few minutes a bank of water, several feet in height, swept down Comanche creek, flooding flats on either side, carrying away houses, etc., and drowning ten persons in Chinatown. On the 22nd, at Meriden, Conn., flats along Harbor Brook completely submerged; streets flooded; heavy freshet in Moshansuck river, flooding northern portion of Providence, R. I. Tioga river very high at Elmira, N. Y.; lower portion of city flooded. At Port Hope and Oshawa, Ontario, severe floods also occurred.

Hail.—4th, Lenoir, N. C.; 6th, Visalia, Cal., Galveston; 7th, Santa Fe, N. M., Augusta, Forsyth, Ga.; 9th, Nashville, Jacksonville, Mayport, Fla., Danville, Ky., West Waterville, Me., Wytheville, Va.; 10th, Knoxville, Norfolk, Cape Henry, McPherson Bks., Ga., Ft. Independence, Mass., Springfield, Mass., Weldon, N. C., Wytheville, Va.; 13th, Visalia, Cal., Santa Cruz, Cal., Brockhaven, Miss., Fayette, Miss., 15th, Montgomery, St. Marks; 18th, Salt Lake City; 19th, McKavitt, Tex., stones one inch in diameter, Davenport, Elmira and Genessee, Ill.; 20th, Mobile, Independence, Kan., Baxter Springs, Kan., Brockhaven, Miss., Wappingers Falls, N. Y., Clarksville, Tex.; 21st, Highlands, N. C., McMinnville, Tenn.; 22nd, Cornish, Me., West Waterville, Me., Standish, Me., Springfield, Mass., Westboro, Mass., Flatouia, Tex., Woodstock, Vt., Mt. Charlotte, Vt.; 23rd, Mt. Desert, Me.; 25th, Sandy Springs, Md.; 26th, Ft. McHenry, Md., Santa Cruz, Cal., Creswell, Kan., and at Laredo, Tex., stones ¼ inch in diameter; 28th, Santa Fe, N. M.

Sleet.—1st, Woods Holl, New London; 8th, Davenport, Detroit; 9th, Oswego, Erie, Indianapolis, Bangor, Me., Detroit; 10th, New Haven, Conn., Boston, Ft. Independence, Mass., West Point, N. Y.; 12th, Cresco, Iowa; 13th, Keokuk, McPherson Bks., Ga.; 14th, Davenport, Oregon, Mo.; 16th, Cleveland, Cresco, Iowa; 18th, Auburn, N. H.; 19th, Detroit; 20th, South Pueblo, Cal.; 21st, Dubuque; 22nd, Eastport, Newbury, Vt., Boston, Cornish, Me., Rowe, Mass., Westboro, Mass.; 23rd, Bangor, Me., Plattsburg Bks., N. Y., Cresco, Iowa; 24th, Cresco, Iowa;

Depth of snow at close of month.—In New England, ¼ to 15 inches; on summit of Mt. Washington, 40 in.; in the Middle Atlantic States, 0.50 to 4 in.; in the Upper Lakes, 0.25 to 3 in.; Indiana, 0.25 in.; Kansas, 2.50 in.; Summit, Col., 50 in.; Pike's Peak, 24 in.; Bismarck, a trace; Salt Lake City, 1 in.; Santa Fe, N. M., 2 in.

Rainy days.—The number of days on which rain or snow has fallen averages as follows: New England, 5 to 13; Middle Atlantic States, 2 to 14; South Atlantic States, 8 to 15; East Gulf States, 5 to 8; West Gulf States, 3 to 8; Lower Lake region, 14 to 20; Upper Lake region, 7 to 15; Upper Mississippi valley, 3 to 16; Lower Missouri valley, 4 to 10; Tennessee and the Ohio valley, 2 to 15; Northwest, 2 to 7; Rock Mountain region, 7 to 19; California, 14 to 21.

Cloudy days.—New England, 4 to 12; Middle Atlantic States, 5 to 22; South Atlantic States, 4 to 18; East Gulf States, 0 to 14; West Gulf States, 0 to 7; Lower Lake region, 11 to 16; Upper Lake region, 8 to 17; Upper Mississippi valley, 8 to 14; Lower Missouri valley, 5 to 14; Tennessee and the Ohio valley, 13 to 18; Northwest, 9 to 15; Rocky Mountain region, 2 to 14; California, 9 to 15.

Precipitation from a cloudless sky.—At Summit, Col., on 3rd, as snow. At Vevay, Ind., 8th, as rain.

RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges about as follows: New England, 64 to 82; Middle Atlantic States, 57 to 81; South Atlantic States, 67 to 80; East Gulf States, 63 to 75; West Gulf States, 64 to 72; Lower Lake region, 67 to 80; Upper Lake region, 63 to 82; Tennessee and the Ohio valley, 64 to 74; Upper Mississippi valley, 62 to 72; Lower Missouri valley, 65 to 75; California coast, 69 to 75; Sacramento valley, 78 to 80. High stations report the following monthly average percentages not

corrected for elevation: Mt. Washington, 76, 7; Pike's Peak, 63, 7; Cheyenne, 48, 4; Denver, 44, 4; Salt Lake City, 66, 2; Boise City, 67, 5 and Winnemucca, 68, 9.

WINDS.

In General—The prevailing winds, at the Signal Service stations, are shown by arrows on chart No. II. By reference to this chart it will be noticed that the prevailing direction east of the Appalachian Mountains is northwest, except along the immediate South Atlantic coast where more northerly or northeasterly winds prevail; while west of the mountains from eastern Tennessee to the Lower Lakes the prevailing directions are from west to south; in the Upper Lake region and Mississippi valley and thence west to the Rocky Mountains the prevailing direction is northerly, except in Dakota and Montana, where south-east to southwest winds prevail; in the Pacific coast States, southerly to easterly winds predominate, except at Los Angeles and San Diego, which record north and northwest winds.

Total Movements of the Air.—The following are the largest monthly movements, as recorded at the Signal Service stations, viz: Pike's Peak, 15,890 miles; Cape Lookout, 11,221 miles; Cape May, 10,612 miles; Thatcher's Island, 10,543; Sandy Hook, 10,279; Indianola, 10,057; Barnegat, 9,146; Cape Henry, 9,093; Cape Hatteras, 8,779; Stockton, 8,602; Dodge City, 8,283; Sandusky, 8,182; Red Bluff, 8,120; Eastport, 7,891 miles.

The smallest are: Deadwood, 1830 miles; Lynchburg, 2133 miles; Visalia, 2134 miles; Springfield, 2588 miles; Knoxville, 2605; Augusta, 2717 miles; Nashville, 3246 miles; Salt Lake City, 3568 miles; Cincinnati, 3769 miles; Pittsburgh, 3777 miles; Dubuque, 3865 miles; Boise City, 3877 miles. At Mount Washington a continuous record is not kept, but velocities over 100 miles per hour were recorded on five days.

Local Storms, Tornadoes &c., have occurred as follows: It is to be understood that the high winds, generally accompanying extensive areas of low pressure have already been noticed. 8th, Augusta, Georgia, about 1 a. m. a tornado struck the city in the southwest portion and travelled towards the northeast; its track was about three hundred yards wide and the destruction of property along its course quite large; it was preceded on the evening of the 7th, at 7 p. m., by a thunder-storm, with hail. In referring to this thunder-storm, the observer at Augusta says: "Subsequent investigations of the tornado that followed this storm have lead me to believe that this thunder-storm was an accompaniment of a tornado that devastated portions of Richmond and Burke counties, to the south of this station; about 7:30 p. m. the clouds seemed to be driven towards the east with great velocity, and whirling and rolling furiously; the edge of the clouds nearest the sky was ragged, as if torn by a whirlwind; I could hear during the intervals of thunder a continual roaring sound, like a strong wind in a forest." On the same day (the 8th.) at 7 A.M. a second tornado passed over Fayetteville, N. C., with a waterspout resembling a funnel shaped column of smoke. It moved from SW. to NE., at about 25 miles per hour, and rose and fell, coming to the earth every 800 or 1,000 yards, and while down took trees, fences and houses in its path. It was accompanied with a sound like distant thunder and about $\frac{1}{4}$ inch rain-fall lasting 15 minutes. A third tornado is also reported on the same day by the schooner "Pride of the East" between Capes Hatteras and Lookout, lasting one hour, with hail and rain. On the 9th, in the vicinity of Jacksonville, Fla., at 3 a. m., "a tremendous wind followed by hail and rain" is reported. 21st, Laconia, Ind., 4 p. m., tornado from SW. width of track 50 or 60 yards, duration from one to two minutes, was accompanied by heavy rain and thunder, and did considerable damage to houses, trees and fences.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily weather indications with the telegraphic reports for the succeeding twenty-four hours, shows a general per centage of omissions of 0.2 per cent., and of verifications of 86.1 per cent. The percentages of verifications for the four elements have been; Weather 89.6 per cent.; Wind, 83.6 per cent.; Barometer, 85.6 per cent.; The percentages of verifications by geographical districts have been; New England, 86.8; Middle Atlantic States, 88.7; South Atlantic States, 85.8; East Gulf States, 84.8; West Gulf States, 87.5; Lower Lake Region, 87.7; Upper Lake Region, 86.3; Tennessee and the Ohio Valley, 85.6; Upper Mississippi Valley, 85.3; Lower Missouri Valley, 83.7. Of the 3,352 predictions that have been made 53 or 1.6 per cent, are considered to have entirely failed; 103 or 3.1 per cent., were one-fourth verified; 433 or 12.9 per cent., were half verified; 450 or 13.4 per cent., were three-fourths verified; 2,313 or 69.0 per cent., were fully verified so far as can be judged from the weather maps.

Cautionary Signals.—During the past month 139 Cautionary Signals have been displayed at 34 stations on the Gulf and Atlantic coasts and on Lake Michigan; of which, 120, or 86.3 per cent., were reported verified within one hundred miles of the station. One signal was ordered up late. Thirty-nine cases of winds, of 25 miles or over, per hour, have also been reported at these stations, for which no signals were displayed.

NAVIGATION.

Stages of Water in Rivers.—In the table on chart No. III are given the highest and lowest readings, for the month, on the Signal Service river-gauges, from which it will be seen that the danger line on gauge has not been reached at any of the stations mentioned, and that the nearest approach to it occurred at Shreve-